COLORADO RIVER WATER CONSERVATION DISTRICT

Protecting Western Colorado Water Since 1937

MEMORANDUM
9 OCTOBER 2004

TO: BOARD OF DIRECTORS

FROM: DAVID MERRITT

RE: HDR HYDROMETEOROLGY STUDY UPDATE

HDR is nearing the point where they can provide forecasts for the coming winter season. I will have a brief powerpoint presentation at the Board Meeting, but the basic gist of their view is as follows.

General Project

1. HDR has investigated a dozen hydro-climate indices for a relationship to the CRWCD River system basin precipitation, runoff and snow pack. Three hydro-climate indices are excellent predictors from our initial studies:

Multi-Variate ENSO Index or MEI (See attached)

The **Multi-Variate ENSO Index or MEI** appears to a be a dominant indicator of above average and below average precipitation in the Upper Colorado and Gunnison River basins. These influences vary with positive, neutral and negative values for both basins.

The Upper Colorado River basin shows its strongest relationship to above average precipitation and snow pack when the MEI value is negative or < -0.50. These conditions are commonly called a La Nina situation. Below normal precipitation is favored by MEI values of >0.50 or an El Nino situation.

The Gunnison River basin shows the exact opposite relationship with above average basin precipitation and snow pack favoring positive MEI values > 0.50. These conditions are called El Nino conditions. Below normal precipitation/snow pack situations are strongly related to La Nina situations.

Thus the Upper Colorado River and the Gunnison Basins are rarely "in-sync" during an El Nino or La Nina weather pattern.

Suite #200 * 201 Centennial Street / PO Box 1120 Glenwood Springs, Colorado 81602
(970) 945-8522 * (970) 945-8799

A neutral value of the MEI between 0.50 to -0.50 is called neutral with warm for values > 0 and cool for values < 0. During neutral conditions the Upper Colorado and Gunnison experience a wide but predictable range of compatibility.

Pacific Decadal Oscillation (PDO)

The temperature of the north Pacific Ocean can either be warmer or cooler than normal. Positive values of the PDO indicate warm ocean temperatures compared to normal while negative values indicate cooler than normal ocean temperatures. Early indications support positive PDO values as indicators of below normal precipitation/snow pack while negative values support above normal precipitation/snow pack. These indicators are used to "modulate" , i.e., increase/decrease the MEI forecast.

Atlantic Multi-Decadal Oscillation (AMO)

The temperature of the Atlantic Ocean basin shows a tendency to be either warmer (positive) or cooler (negative) than normal over period of 10-40 years creating the AMO. A positive AMO phase just began last Fall and is closely related to the above normal number of hurricanes that hit Florida and the weak summer SW monsoon. A negative AMO phase favors strong SW monsoons and fewer Atlantic hurricanes. The AMO can either be "in" or "out" of phase with the PDO. It is also used to modulate or adjust the MEI forecast.

2. Our initial "rough cut" outlook for the Colorado and Gunnison River basin runoffs for the WY2004/2005 was completed yesterday:

Upper Colorado (Granby-State Line) at 90% of normal +/- 10 percent with 75% confidence.
Gunnison River at 120% of normal +/- 10% with 85% confidence.

Our outlooks will be refined weekly into December and could change as the most definitive Index values become available between now and mid-December. As an interesting note the Denver metro area has had four consecutive months of above normal precipitation for only the third time in history. The last time a similar period of above normal took place was in the summer/fall before WY 92/93. The Upper Colorado snow pack was 124% of normal April 1, 1993 and Arizona experienced significant flooding. Differences exist in the weather patterns of Fall 1992 and 2004. Perhaps the key to this year's forecast will be those differences.

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